

# Towards a Standardised Definition of Room Categories for Healthcare Facilities (RakaS)

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## ABSTRACT

**Purpose:** Different industry-wide room categorisation standards and norms pertaining to space definitions have been set up in recent years. However none of them are being completely applied in Swiss healthcare organisations because they apparently fail to fully cover the needs of Facility Management in Healthcare. To overcome this situation, the standardised Room Categorisation for Hospitals (RakaS) version 1.0 was presented combining different aspects of existing norms, as well as the needs voiced from practice; the framework had, however, yet to be validated after application in practice.

**Methodology:** Another extended desk research into standardisations and norms for rooms and space was followed by a multi-stage evaluation process applying consortial research principles involving practice. A case study workshop with one specific hospital provided the basis for a semi-structured interview guideline for subsequent expert interviews with managers responsible for room-specific tasks in healthcare organisations. The sample includes eight different German-speaking Swiss hospitals of different categories. After a content analysis of the data, the framework could be validated, adjusted and extended.

**Key Findings:** The existing systematically illustrated overview with all room categories and the corresponding table with various details concerning the definitions of the categories and rooms were slightly extended and refined. One major change is the introduction of color-codes indicating the differentiation between room categories.

Based on the data analysis, a documentation describing the details of the discussions and decisions and a keyword index to support the finding of desired keywords concerning room category and room usage were developed and added to the framework.

**Intended Impact:** RakaS 2.0 is now a validated framework, providing a foundation for a standardised room classification. It is thus the basis for both benchmarking between healthcare organisations in terms of room KPIs and for transferring data to digital models in a standardised manner, allowing better planning and calculation of the necessary areas before construction.

**Paper type:** Research Paper

**Keywords:** Room Categories, Benchmarking, FM in Healthcare, Hospitals, Standardization

## 1 INTRODUCTION

Different industry-wide room categorisation standards and norms pertaining to space definitions have been set up in recent years. However, in previously conducted projects, it became clear that none of the norms mentioned above were being completely applied in Swiss healthcare organisations, indeed no standard was being used as a basis for room definitions at all. The evident reason for this was that none of the norms fully covered the needs of Facility Management in Healthcare (FM in HC).

To rectify this situation, the standardised Room Categorisation for Hospitals (RakaS) 1.0 was presented (Gerber, Hinnen, & Hofer, 2017). In the first version of RakaS, different systems of room categorisation and definitions were listed, showing the prevailing state of classification: Firstly, general inter-industrial classifications with a focus on space without a specific healthcare connection were listed:

- DIN 277-2:2005 and DIN 18960:2008-02
- SIA 416:2003 as well as SIA 0165:2000

Secondly, DIN 277-1:2016 was introduced with its classification of a specific healthcare section.

Thirdly, specific healthcare room classification norms were presented:

- DIN 13080-1999
- DIN 13080:2016
- GEFMA 812:2014-09

Based on these existing norms, a specific categorisation suitable for application in the complex context of healthcare facilities was developed in collaboration with hospital partners. The existing definitions and numberings were adopted as much as possible, however supplemented with specifications and sub-categories where necessary. The output was a systematically illustrated room categorisation and a corresponding table explaining the details behind all the different room categories. RakaS 1.0 was a deductively developed framework; its usability in practice had not yet been evaluated. After the application of the framework and a systematically conducted evaluation, it was possible to adapt it accordingly. In this article, the evaluation methodology conducted and the updated and extended framework are presented.

## 2 RESEARCH QUESTION, RESEARCH OBJECTIVES

The research question for the evaluation was defined as to find out which changes have to be made in the RakaS 1.0 framework in order for it to fulfil the quality criteria mentioned below.

Since RakaS is understood as a conceptual model developed on the basis of Design Science Research (DSR) principles, for the assessment of the quality of the model, the quality criteria framework of Gerber et al. (2018) was chosen. The main goal was to evaluate utility, practicability and viability by asking

- Is the goal, scope and contribution of the conceptual model clearly outlined?
- Is the context of the conceptual model relevant?
- Is the conceptual model economically efficient?
- Does practice accept and utilise the conceptual model?

- Does it satisfy the needs of the users?
- Does it solve the problem defined?
- Is it clear, readable and interpretable (using the appropriate language and adequate symbols)?
- Is it easy to understand and to identify the essentials?
- Does it have a systematic design and is it consistent (in meaning, structure, format and syntax)?
- Is it concise and compact?
- Is it comparable to other, parallel models?

The objective of doing this particular research was to contribute to a common understanding about room definitions within the HC industry as a basis for a systematic and transparent allocation of cost and future benchmarking initiatives. By doing so, the authors hope to contribute to a more sustainable provision of healthcare services in the future.

### 3 METHODOLOGY

Firstly, another extended desk research into standardisations and norms for rooms and space was conducted which also included available individual room categorisations used in Swiss hospitals. Secondly, a multi-stage validation was conducted applying consortial research according to Österle and Otto (2009) for the validation of the framework. A case study workshop with one specific hospital currently revising their room category system provided the basis for a semi-structured interview guideline (Flick, 2009a). Expert interviews with managers responsible for room-specific tasks in healthcare organisations were asked for individual feedback and opinions. The sample includes eight different German-speaking Swiss hospitals covering the following categories: General hospitals, Centrum care (Level 1, University Hospitals); General hospitals, Centrum care (Level 2); Psychiatric clinics (Level 1) and Special clinics (Surgery, Gynaecology/Neonatology, Paediatrics, Geriatrics, Diverse) according to BAG (2018). For the data analysis, the qualitative content analysis method was used (Flick, 2007; Mayring, 2010). The content generated was listed in tabular form using matrices. The order of the content was mostly determined by predefined codes and categories which followed the structure of the interview guideline (Flick, 2009b; Saldaña, 2009).

### 4 RESULTS

The result of the evaluation process is a validated framework providing a common understanding of room categories suitable for the application in different further practical and research developments. The output of the framework has four components:

- (1) A documentation describing the details of the discussions and decisions
- (2) A systematically illustrated overview with all room categories
- (3) A corresponding table with various details concerning the definitions of the categories and rooms
- (4) A keyword index to support the finding of desired keywords concerning room category and room usage

These four components are presented in the following paragraphs. The systematically illustrated overview (2) and the corresponding table (3) are revised versions of RakaS 1.0. The documentation (1) and the keyword index (4) are components newly added to the framework.

### (1) Documentation

The documentation explains in detail the idea of standardised room categorisation. First of all, the starting position of the whole project as well as its objective and the benefits are discussed. Furthermore, the research project and its results are presented. The main goal of the documentation is to explain how to use RakaS 2.0. The documentation can be downloaded under [www.zhaw.ch/ifm/fm-healthcare/rakas/en](http://www.zhaw.ch/ifm/fm-healthcare/rakas/en).

### (2) Systematically illustrated overview

The room category overview is still based on the structure of RakaS 1.0 as the evaluation has shown that this setup is perceived as useful. Overall it can be said that the experts prefer a lean, clear structure instead of an extended version covering every detail, but being confusing. Instead, it was decided to set up a keyword index, allowing one to go more into detail. These include indications on how to handle concrete situations like detailed specifications of individually-designed room-usages such as “sanitary rooms”, “toilets”, “showers” or “bathrooms” where there might be many different combinations, depending on installations and gender division. A further aspect is the dual- or multi-use of rooms like the seating area in food zones, which can also be used for work. Therefore, only minor adjustments were performed in the overview illustrated, e. g. supplementing "hazardous materials storage" with “storage / issuing rooms”. In addition, the case study showed that applying the colour scheme of the SIA416 norm (SIA 416:2003) was perceived as user-friendly by most experts and was therefore integrated into the illustration.

Figure 1 shows the principle of the systematically illustrated overview. The detailed illustration suitable to print-out can be downloaded under [www.zhaw.ch/ifm/fm-healthcare/rakas/en](http://www.zhaw.ch/ifm/fm-healthcare/rakas/en).

### (3) Corresponding table

The corresponding table explains the details of the room categories:

- Column 1: names the main room categories
- Column 2: lists the room types mainly corresponding with DIN 277-2:2005, partially adjusted with the descriptions from DIN 277-1:2016 but also including newly-added categories.
- Column 3: states the sources of the definitions in column two; in this way it is possible to find the original text if necessary, to distinguish between the previous definitions and the extended definitions of this project.
- Column 4: defines and specifies the room categories
- Column 5: justifies differentiations

As the illustrated overview only underwent minor adjustments, little change had to be made within the table - only the additional room and the corresponding details were added.

Table 1 shows the principle - the detailed version of the table can be downloaded under [www.zhaw.ch/ifm/fm-healthcare/rakas/en](http://www.zhaw.ch/ifm/fm-healthcare/rakas/en).

Figure 1: Systematically illustrated overview of RakaS Version 2.0; Readable version can be downloaded under [www.zhaw.ch/ifm/fm-healthcare/rakas/en](http://www.zhaw.ch/ifm/fm-healthcare/rakas/en)

## RakaS 2.0 – Illustration Room Categorization

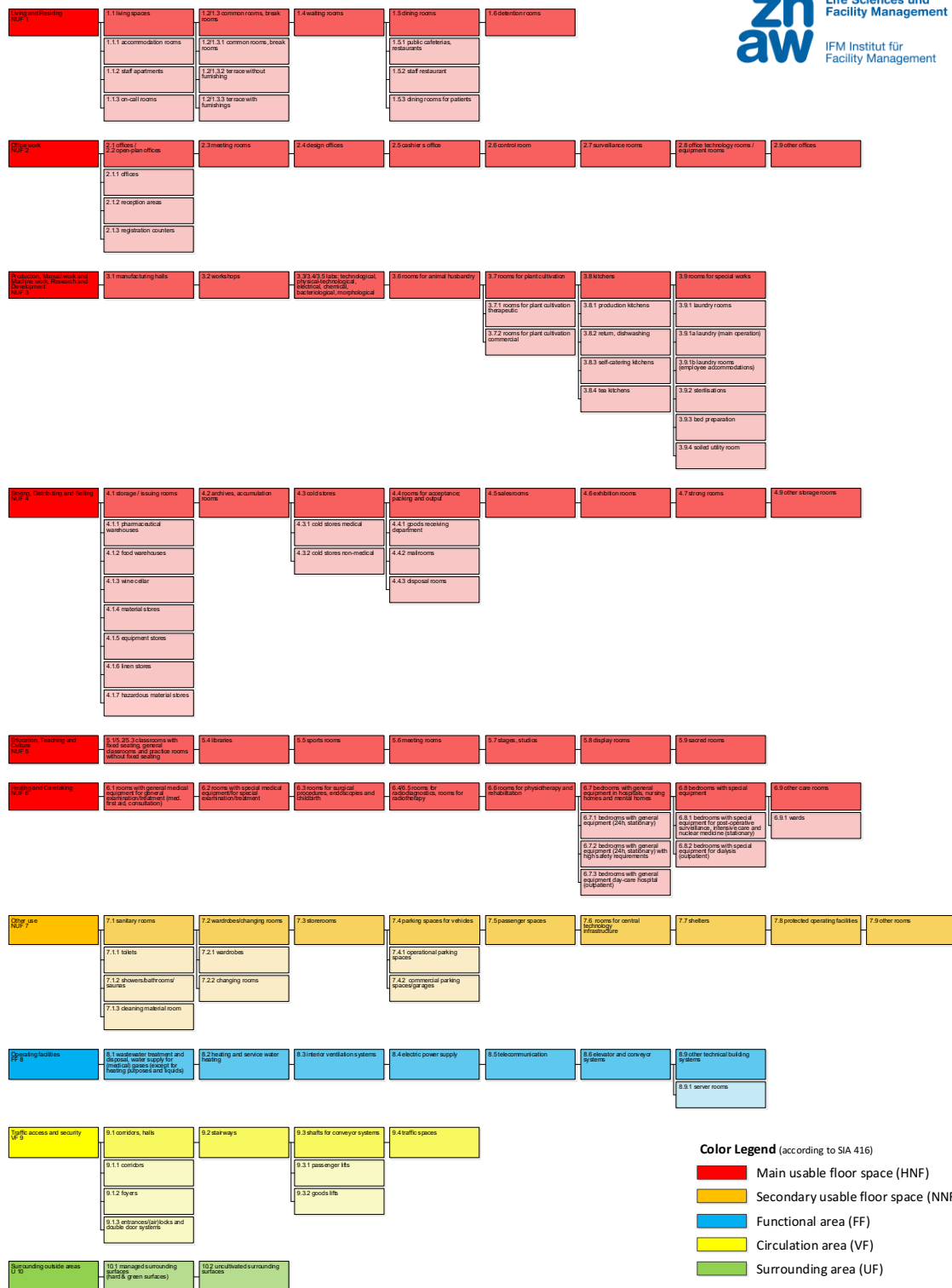


Table 1: Excerpt of table with details about RakaS 2.0; Readable version can be downloaded under [www.zhaw.ch/ifm/fm-healthcare/rakas/en](http://www.zhaw.ch/ifm/fm-healthcare/rakas/en)

| Room Category               | Room type/-naming                     | Source / Notes on                       | Definition/Specification IFM   | Reasons for content-related differentiating   |
|-----------------------------|---------------------------------------|---|--|---|
| Living and Residing (NUF 1) | -                                     | DIN 277-1:2016                          | living spaces, common rooms, waiting rooms and dining rooms  | -   |
|                             | 1.1 living spaces                     | DIN 277-2:2005                          | living rooms and bedrooms in apartments, accommodations and employee apartments incl. eat-in kitchens, balconies, porches belonging to accommodation unit; on-call rooms | -   |
|                             | 1.1.1 accommodation rooms             | DIN 277-1:2016                          | rooms of patient or guest hotels incl. eat-in kitchens, balconies, porches belonging to accommodation unit; on-call rooms  | -   |
|                             | 1.1.2 staff apartments                | Project                                 | rooms of employee apartments incl. eat-in kitchens, balconies, porches belonging to accommodation unit; on-call rooms  | -   |
|                             | 1.1.3 on-call rooms                   | Project                                 | on-call rooms for employees with washrooms and beds  | Only temporary use vs. permanent use in residential rooms   |
|                             | 1.2/1.3 common rooms, break rooms     | Project, DIN 277-1:2016, DIN 277-2:2005 | common rooms, day rooms, break rooms, quiet rooms incl. adjacent balconies and terraces  | -   |
|                             | 1.2/1.3.1 common rooms, break rooms   | Project, DIN 277-1:2016, DIN 277-2:2005 | common rooms, day rooms, break rooms, quiet rooms incl. adjacent balconies   | Inside rooms have a different standard of maintenance and cleaning to outside areas   |
|                             | 1.2/1.3.2 terrace without furnishings | Project                                 | terraces with furnishings (fixed or mobile)  | Outside areas have a different standard for maintenance and cleaning to inside rooms  |
|                             | 1.2/1.3.3 terrace with furnishings    | Project                                 | terraces with furnishings (fixed or mobile)  | Outside areas have a different standard for maintenance and cleaning to inside rooms; furniture causes more cost for handling, cleaning and maintenance |
|                             | 1.4 waiting rooms                     | DIN 277-2:2005                          | waiting rooms for patients for examination/therapy   | -   |
|                             | 1.5 dining rooms                      | DIN 277-2:2005                          | dining rooms and cafeterias for patients, employees and guests   | -   |
|                             | 1.5.1 public cafeterias, restaurants  | Project, DIN 277-2:2005                 | cafeterias and restaurants publicly accessible, served or self-service   | Have longer opening hours and more extensive infrastructure compared to staff restaurant  |
|                             | 1.5.2 staff restaurant                | Project                                 | Restaurants for staff only, served or self-service, open only during peak periods less extensive infrastructure compared to public restaurant                            | Have shorter opening hours and less extensive infrastructure compared to public restaurants and cafeterias  |
|                             | 1.5.3 dining rooms for patients       | Project                                 | dining rooms for patients, in the wards  | -   |
|                             | 1.6 detention rooms                   | DIN 277-2:2005                          | n/a  | (see 6.7.2 bedrooms with general equipment (24h) with high safety requirements)   |

#### (4) Corresponding keyword index

A keyword index was strongly suggested by most of the experts. A vast collection of key words concerning room categories and room usages provided by the experts and arranged in alphabetical order supports the user of the framework. In this way, it is possible to quickly locate the corresponding number of the category, to detect terms that might be used synonymously or which might be included in a category without being mentioned in detail on the overview. The keyword index can be downloaded under [www.zhaw.ch/ifm/fm-healthcare/rakas/en](http://www.zhaw.ch/ifm/fm-healthcare/rakas/en).

## **5 CONCLUSION**

Having systematically evaluated the framework of Room Categorisation for Healthcare Facilities by experts in practice, a validated RakaS 2.0 version can be presented which was assessed as utile, practicable and viable according to the quality criteria framework proposed by Gerber et al. (2018):

- The goal, scope and contribution of the conceptual model was declared to be outlined clearly.
- The context of the conceptual model proved to be very relevant.
- Because the framework is freely available for practice, the economic efficiency can be assessed as high for the healthcare institutions.
- The framework is being demonstrably applied in practice.
- The experts reported that the framework satisfies their need for a guideline on how to define room categories in practice.
- The interviews showed that the framework was clear, readable, consistent, compact and easy to understand, and has a systematic design.
- As the framework is based on existing norms and explains the connections, it is also comparable to them.

It can thus be concluded that RakaS 2.0

- provides a basis for a standardised room classification and is thus the basis for benchmarking between healthcare organisations in terms of room KPIs
- is the basis for transferring data to digital models in a standardised manner, allowing better planning and calculation of the necessary areas before construction.

## **6 CRITICAL REFLECTION, LIMITATIONS AND OUTLOOK**

So far, the model has only partially been applied in practice by the interviewed partners – the feedback is therefore partially based on assumptions. The investigations were carried out only in the German-speaking areas in Switzerland – a translation into French and Italian would allow the evaluation to be extended across Switzerland. It must also be mentioned that only the German version of RakaS 2.0 was evaluated – the English version is a mere translation which has not been evaluated in practice. With respect to the sample, the wide variety of experts coming from space management, project management, IT application management, the department of technology, operations, infrastructure and operations as well as someone with a strong financial background have presented a valuable mix providing a variety of perspectives.

The framework should now be applied in practice and used by different hospitals before being reassessed. It would be exciting to see other countries taking such an approach to standardised room division in hospitals because it would then be possible to start comparisons on an international level and hospitals could benefit from each other. In addition, it would make sense to involve other partners from other disciplines, such as construction planning or architecture. A combination of interior design and medical technology could be used as a basis for better alignment of room type and usage and thus contribute to more sustainable resource planning. Great potential is expected when it comes to future projects defining and applying KPIs; these projects could use the categorisation and could, based on that, create systematic, comparable space KPIs. Combining the room categorisation with Service Level Agreement management (particularly in cleaning and energy management) in the future is also suggested.

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